

A comparative policy analysis of seat belt laws

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16 Abstract <p>This analysis examined data from a variety of sources to estimate the benefit of enhancing Iowa's current law to require all passengers to use seat belts. In addition to assessing Iowans' opinions about changing the law, a literature review, a legislative policy review, and analysis of Iowa crash data were completed. Currently 28 states enforce seat belt laws for all passengers. Belted passengers riding with an unbelted passenger are 2 to 5 times more likely to suffer fatal injuries in a crash relative to when all occupants are using seat belts. Iowans are highly compliant (90%-94%) with the current seat belt law for front seat occupants. Of more than 1000 Iowans surveyed, 85% said they <i>always</i> use a seat belt when riding in the front seat, but only 36% always do so when they ride in the back seat. The most common reasons given for not using seat belts in the back seat are forgetting to buckle up and because it is not the law. Iowans widely support strengthening Iowa's seat belt law — 62% said Iowa law should require all rear seat passengers to use seat belts. Four out of five respondents said they would use seat belts more often when sitting in the rear seat if it was the law. It is estimated rear seat fatalities would decrease about 48%, from 13 to 7 fatalities annually, if an all-passenger law was implemented in Iowa.</p>					
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Introduction

Currently, in Iowa all adults in the front seat of a vehicle must be belted (enacted July 1, 1986), children age 10 and younger must be restrained in age- and size-appropriate seats (2004), and all passengers age 18 and younger must wear seatbelts (July 1, 2010). There is no mandate that passengers age 18 and older must wear seatbelts when riding in the rear seat of passenger vehicles. With the support of the Iowa Department of Transportation (DOT), the University of Iowa's Public Policy Center (UI PPC), Iowa Social Science Research Center (ISRC), and Injury Prevention Research Center (IPRC) conducted a policy analysis of an "all passengers belted" law, which, if implemented, would require adults in the rear seat to be belted.

In 2011, Iowa reported a front-seat belt use rate of 93.5% for drivers and passengers. Despite this relatively high front-seat use rate, in that same year, 43% of the 265 passenger vehicle occupants who lost their lives on Iowa roadways were unrestrained. Restraint use was unknown for another 32 fatalities, or 12% (NHTSA, 2013). The same NHTSA report states the use of lap/shoulder belts is associated with 45-60% reduction in fatal injuries for front seat occupants. Another analysis of safety belt effectiveness for rear-seated passengers reports that buckling up in the back seat can reduce the risk of fatal injuries by 55-75% (Zhu, Cummings, et al., 2007).

Project overview

The research activities described in this report collect data from a variety of sources to estimate the benefit of enhancing the current law to include the belting of all rear-seated occupants. Iowans' attitudes towards enhancing the current seat belt law so that all passenger vehicle occupants in Iowa, regardless of age or seating position, would be required to use passenger restraints (i.e., a comprehensive law) was also assessed.

The research activities addressed the following questions:

1. What does previous research say about the effectiveness of seat belt laws in terms of increasing seat belt use and the potential life-saving and injury-reducing benefits?
2. Considering Iowa crash data, what are the potential benefits of enhancing the current seat belt laws in terms of fatalities and injuries?
3. What laws concerning the use of seat belts have been implemented in other states, particularly those that border Iowa? What is the language of their policies and how are the laws enforced?
4. Would the citizens of Iowa support enhancements to the state's seat belt law?

An interdisciplinary team, consisting of driving safety and social science researchers from across the University of Iowa campus, conducted the following research activities:

1. A **literature review** of seat belt laws in general and comprehensive (i.e., covering all vehicle occupants) laws in particular.
2. **Crash data analysis** to summarize the usage of seat belts in fatal and severe injury crashes in Iowa.
3. A **legislative review** and interviews with key stakeholders from nearby states to identify potential issues with implementation of stronger seat belt laws.
4. Conduct a **public opinion survey** of Iowans to quantify attitudes of safety belt laws.

The details for each of these research activities are presented in stand-alone sections of this report.

Formation of the Technical Advisory Committee

The first task was to form a technical advisory committee (TAC). Potential TAC members were identified in consultation with the Project Manager at the Iowa DOT (Steve Gent, Director of the Office of Traffic and Safety). All individuals approached indicated their willingness to serve on the TAC. They are:

- Sandra Larson, Systems Operations in the Highway Division
- Kim Snook, Office of Driver Services
- Mikel Derby, Office of Policy and Legislative Services
- Jan Laaser-Webb, Office of Traffic and Safety
- David Lorenzen, Office of Motor Vehicle Enforcement
- Kathy Leggett, Director of the Center for Advocacy & Outreach at Blank Children's Hospital, UnityPoint Health – Des Moines
- Patrick Hoyer, Bureau Chief, Iowa Governor's Traffic Safety Bureau

A majority of the TAC members participated in a conference call early in the project period to provide feedback on the content of the opinion survey. Most also attended one or more briefing presentations (conducted both by phone and in person) at the conclusion of the project. The research team is very grateful for the time and contributions of the TAC members and the Project Manager.

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Literature Review

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Introduction

The first component of the policy analysis was a broad review of the seat belt literature, with a special focus on research concerning seat belts in the rear seating positions. After an initial review, several primary topic areas were identified. This summary includes research about the effectiveness of seat belts in reducing injury and fatalities, the economic costs of unrestrained vehicle occupants, and the effect of seat belt laws and communication campaigns on rates of belt use.

Background

Today 49 states, the District of Columbia and Puerto Rico have laws requiring adults to use seat belts (Insurance Institute for Highway Safety, 2013). New York was the first state to enact a law mandating seat belt use in December 1984. New Jersey followed just 4 months later with a law allowing ticketing for non-use of seat belts only if another violation had been committed, thus adopting what is known as a secondary enforcement law. Iowa implemented its primary enforcement law requiring drivers and front seat passengers to be belted on July 1, 1986.

Relative to the national average, Iowa has historically had a high rate of seat belt use (see Figure 1). In 2004, Iowa's seat belt use rate was 86.4%; in 2012, it was 92.4% (Larson, Gorshe, & Zhu, 2012) after peaking at 93.5% in 2011 (Chen & Ye, 2012). Meanwhile, the national averages were 80% in 2004 and 86% in 2012 (Pickrell & Ye, 2012).

Iowans have positive attitudes towards wearing seat belts and the laws that require their use. Albrecht, Li & Gkritza (2013) asked Iowans their opinions about a variety of safety culture topics. When asked how well the state of Iowa has done in increasing safety belt use, 82.3% of residents surveyed responded "excellent" or "good," and 80% viewed people not wearing seat belts as a serious threat to traffic safety. Three out of every four respondents (77.4%) said that it is seldom or never acceptable to drive without a seat belt. Opinions on seat belts use for passengers in the back seat, however, do not seem to be as strong. When asked about allowing passengers in the back seat to ride without wearing a seat belt, 32.2% said they had allowed this in the past 30 days.

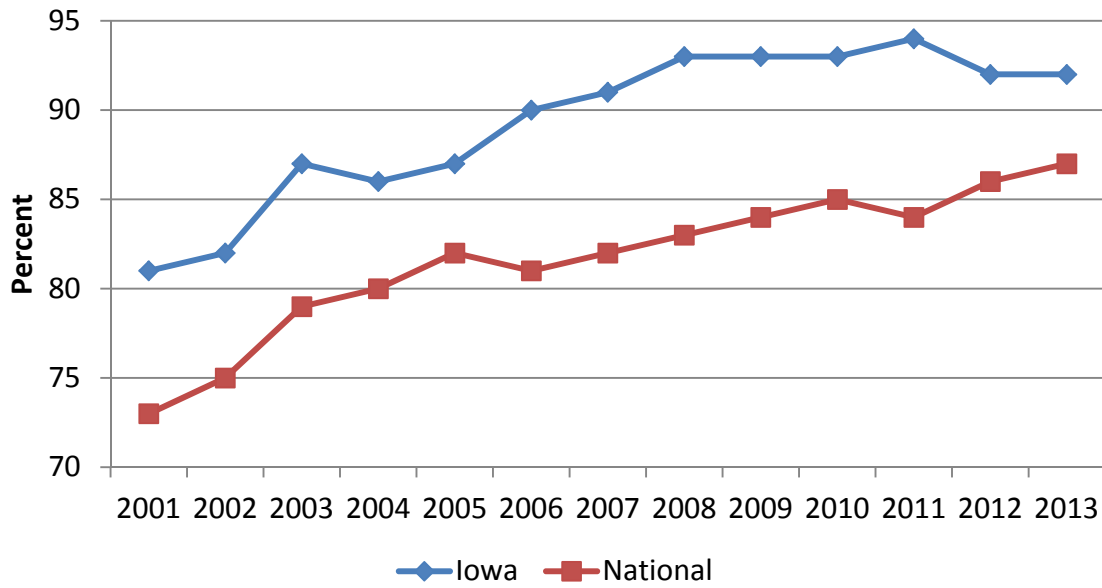


Figure 1. Observational seat belt use by front seat occupants in Iowa and nationally, 2001–2013

Seat Belts Increase Safety

It has been understood for decades that seat belts save lives (Evans, 1986). Seat belts are the most effective means of reducing injuries and fatalities from motor vehicle crashes; specifically they are 45% effective in cars and 60% effective in light trucks (Kahane, 2000). The risk of injury in a crash is lower for vehicle occupants with their seat belts fastened whether they are the driver, front seat passenger, or rear seat passenger (de Lapparent, 2008). Conversely, whether in the front or back seat, unbelted vehicle occupants have a three-fold increase in injury score (Brown & Cline, 2001). A study of belted and unbelted adult occupants in motor vehicle crashes in Wisconsin found that those who were unbelted were more likely to require admission to an in-patient unit, and more likely to sustain severe injuries; specifically, injuries to the face, head, abdomen and lower extremities (Allen, Zhu, Sauter, Layde, & Hargarten, 2006). Unbelted occupants presenting at emergency rooms (ER) were admitted to inpatient units 2.5 times more than belted occupants (19.7% and 7.2% respectively), and suffered fatal injuries at a rate seven times higher (0.64% and 0.09%, respectively) (Allen et al., 2006).

Seat belt use is much lower in the rear seat (50%) than in the front seat (82%) (Trowbridge & Kent, 2009). Even though the rear seat is a less common seating position for adults, the exposure to risk is still significant. Of all patients presenting at ERs, only

3.6% were rear seat occupants; nevertheless, these represented 8% of those who died while in the ER (Allen et al., 2006).

The use of seat belts in the rear seat is 60% effective in reducing motor vehicle crash fatalities in passenger cars, and even more so—70%—in light trucks (Zhu, Cummings, Chu, & Cook, 2007). An examination of fatal crash data from the Fatality Analysis Reporting System (FARS) found the odds of unbelted rear seat passengers being killed are 2.7 higher compared to a belted rear seat passenger (Mayrose et al., 2005). Through the use of seat belts, it may be possible to reduce fatalities of rear seat passengers by 55-75% (Zhu et al., 2007). The severity of injury for rear seat passengers was found to be similar to front seat passengers, although the type of injuries differed (Bodiwala, Thomas, & Otubushin, 1989).

Riding in the rear rather than the front seat offers only slight protection, and is not a substitute for wearing a seat belt (Brown & Cline, 2001). Improvements in rear seat occupant safety have not kept pace with improvements in front seat occupant safety (Bilston, Du, & Brown, 2010). In vehicles model year 2000 and newer, belted adults in the rear seat were 31% more likely to suffer fatal injury than belted adults in the front seat (Sahraei, Digges, & Marzougui, 2010). Specifically, there have been reductions in head injuries for front seat occupants without similar reductions for rear seat occupants (Bilston et al., 2010). While advanced safety technologies, such as force-limiting seat belts that release a small amount of extra webbing during a crash, would increase safety in rear seats as they have in front seats, they can only do so if vehicle occupants choose to buckle up. As the next section details, increasing the use rate of occupants in rear seating positions would have significant safety benefits for all vehicle occupants.

Threat to Other Occupants From Unbelted Rear Seat Passengers

Often in a crash, unbelted rear seat occupants are ejected from their seats and propelled into other areas of the vehicle cabin. Impact with the seat in front of them can result in minor to moderate head and face injuries, while more severe injuries result from impact with other parts of the vehicle, such as doors, pillars and the roof (Bodiwala et al., 1989). Such unrestrained passengers become projectiles that increase the chance of injury and death for other occupants as well.

Even in low-speed crashes, unbelted rear seat occupants exert thousands of pounds of force. For example, in a head-on crash at 30 mph, an unbelted passenger weighing 60 lb. exerts approximately 2700 lb. of force into the driver's seat (Mayrose et al., 2005). Factors that affect the severity of injuries during motor vehicle crashes include seating position and belt use of passengers (Nukenine & Daniel, 2011). Belted occupants in any seating position are at a higher risk of injury (adjusted risk ratio of 1.9) and death (adjusted risk ratio of 4.8) when seated between an unbelted occupant and the direction of force in a crash (MacLennan, McGwin, Metzger, Moran, & Rue, 2004). For

example, a belted occupant on the left side of a vehicle experiences a higher risk of injury or death in a left-side collision when there is an unbelted occupant seated to their right. Analyses of FARS data show that a belted driver seated in front of an unbelted passenger during a head-on crash is more than twice as likely to suffer fatal injuries than a driver seated in front of a belted passenger (Bose, Arregui-Dalmases, Sanchez-Molina, Velazquez-Ameijide, & Crandall, 2013; Mayrose et al., 2005). An analysis of crashes in Japan found drivers and front seat passengers wearing seat belts experienced a five-fold increase in risk of death when rear seat passengers were unbelted (Ichikawa, Nakahara, & Wakai, 2002).

Economic Costs of Unrestrained Occupants

The cost of motor vehicle crashes is borne by society in several ways. These include private insurance plans, governmental sources, out-of-pocket expenses for individuals, lost wages, costs associated with travel delays, and lost revenue to health care providers when crash-related medical expenses go unpaid. Blincoe, Seay et al. (2002) estimate that motor vehicle crashes in the US in 2000 cost \$230.6 billion. Private insurers covered half these costs, while individuals involved in the crashes paid for about 26%. Federal and state governments paid 9%, with the other 14% being covered by other sources (Blincoe et al., 2002). The same study found that while seat belt use saved \$50 billion, the cost of unbuckled vehicle occupants was \$26 billion (Blincoe et al., 2002). If individuals involved in crashes bear 26% of the costs associated with motor vehicle crashes, then the remaining 74% is borne communally by society through insurance premiums, taxes, lost investment income, higher health care costs, and travel delays.

Analysis of the statewide direct and indirect cost savings due to safety belt use for the state of Iowa was calculated shortly after the seat belt law for front passengers was implemented. Using data from 1987 and 1988, a lifetime direct cost savings of \$69.5 million was associated with one year of increased seat belt use for adults in the front seat (Nelson, Peterson, Chorba, Devine, & Sacks, 1993). This savings was associated with an increase in seat belt use from 18% to 50.5%.

This use rate still includes many occupants who were not covered by Iowa code requiring the use of seat belts, such as rear seat occupants. It is reasonable to expect the savings would have been greater if rear seat occupants were required to wear seat belts due to the increased risk posed to other occupants by unbelted occupants in a crash. Unbelted occupants accounted for 78% of all hospital costs (Nelson et al., 1993). Unbelted occupants who sustained head and spinal cord injuries accounted for 43% of all hospital payments, but were only 18.7% of the study population (Nelson et al., 1993). The mean hospital costs for unbelted occupants was 3.6 times higher for unbelted occupants (Nelson et al., 1993).

Effect of Seat Belt Laws on Usage

Unlike passive safety systems such as airbags, which are actually designed to be used with a seatbelt for maximum effectiveness, using a seat belt requires an action on the part of the individual. Some people wear a seat belt based on their understanding of the safety benefit alone, others will do so if the law requires it, and for still others, it is the threat of penalties due to enforcement that convinces them to buckle up. Being aware of the safety benefit seems sufficient to motivate only a small proportion of the population to wear seat belts; even though approximately 70% of respondents to AAA Safety Culture surveys conducted from 2009–2012 indicated that driving without a seat belt is “unacceptable,” about 1 in 5 admitted they had driven without a seat belt in the past 30 days (Arnold, Girasek, Tefft, & Grabowski, 2013). Iowans seem to realize the importance of law enforcement in changing behavior; those surveyed said enforcement is more effective (38.9%) than education (30.4%) in making driving in Iowa safer (Albrecht et al., 2013). Additionally, fewer than half (43.7%) agreed that the chance of being caught when not wearing a seat belt is small.

Enforcement programs that are effective have common components: increased publicity about the importance of using seat belts, increased enforcement of the law, and high visibility and awareness of enforcement (Williams & Wells, 2004). Deterrence theory suggests that if people believe an offense is likely to be detected, and that they will be punished for the offense, they are more likely to comply with the law. In order to establish a climate of deterrence, primary laws are needed, because even if non-use is detected in the absence of another offense the likelihood of punishment is minimal. The effects of enforcement programs can be short-lived unless such programs are extended over a long enough time to generate cumulative effects (Williams & Wells, 2004).

Primary vs. Secondary Laws

The type of law and associated penalties affect the rates at which people use seat belts. There are two types of seat belt law, primary enforcement and secondary enforcement. Primary enforcement (sometimes called standard enforcement) allows an officer to issue a citation for a seat belt violation without observing any other offense. Secondary enforcement laws allow officers to issue citations for seat belt violations only after a vehicle has been stopped for another offense.

Use rates are generally 12% higher with secondary enforcement and 21% higher with primary enforcement than in the absence of a seat belt law (Houston & Richardson Jr, 2005). A 2001 review of studies comparing primary laws to secondary laws found primary laws were more effective in preventing injury and death (Dinh-Zarr et al., 2001). Primary enforcement states have seat belt use rates an average of 9 or 10% higher than states with secondary enforcement (Beck & Shults, 2009; Houston & Richardson Jr, 2005). In 2006, 14 of the 15 states with the lowest use rate were secondary law states,

and the 15 states with the highest use rate were primary law states (Beck & Shults, 2009). Additionally, primary laws had a greater effect than secondary laws on those who are more at risk for motor vehicle crashes (Dinh-Zarr et al., 2001). They may also be more effective at narrowing gaps in seat belt use rates between groups with different rates, such as ethnic groups (Briggs et al., 2006), age groups such as teens (Carpenter & Stehr, 2008; Durbin, Smith, Kallan, Elliott, & Winston, 2007), and those engaging in higher risk behaviors such as drinking and driving (Perkins, Helgersen, & Harwell, 2009).

Transitioning from a Secondary to Primary Law

States that strengthened their seat belt policies and made the transition from secondary to primary laws have seen increases in seat belt usage and reductions in fatalities and injuries. A 2005 review of passenger vehicle deaths in states that changed from secondary to primary enforcement seat belt laws found annual fatality rates were reduced by 7% (Farmer & Williams, 2005). Specifically, in Michigan seat belt use rates increased by 13% after primary enforcement was implemented, and use rates remained 10% higher than before transition one year later (Eby, Vivoda, & Fordyce, 2002). California saw a decrease of 1200 motor vehicle crash injuries per month after changing from secondary to primary enforcement of their seat belt law (Houston & Richardson Jr, 2002).

A contributing factor to the difference in seat belt use rates under primary and secondary laws may be differences in enforcement. Police are sometimes reluctant to aggressively ticket for seat belt violations, either because they don't view it as a serious offense or because they feel it is a matter of personal choice. Strong enforcement can solidify public and political support (Williams & Wells, 2004).

Amount of fines, Penalties and Enforcement

Another important factor in the successful enforcement of seat belt laws is the penalty in place for a violation. Some states' fines are so low they offer little deterrence to not using a seat belt. For example, Wisconsin has a primary seat belt law but a low use rate of 79%. The penalty for not wearing a seat belt, a \$10 fine, may be too insignificant to induce compliance with, and perhaps enforcement of, the law. Consequently, Wisconsin's 2011 seat belt use rate resembles use rates in several states with secondary laws. On the other hand, states with higher fines for seat belt violations have higher use rates (Houston & Richardson Jr, 2005). A \$25 fine was associated with a 3.8% increase in seat belt use, and the level of fine was correlated with higher seat belt use rates in both primary and secondary enforcement states (Houston & Richardson Jr, 2005). Applying penalty points to driver's licenses may be the most effective method of convincing current non-users of seat belts to start buckling up (Williams & Wells, 2004). For any penalty to be effective there must be a perception that there is potential for the penalty to be applied through enforcement.

Seat belt use increases in tandem with perceived risk of being ticketed (Chaudhary, Solomon, & Cosgrove, 2004). In a review of studies conducted by cities, counties, states, and at the national level, both targeted patrols and supplemental patrols were found to be effective techniques for enhanced enforcement campaigns (Dinh-Zarr et al., 2001). While use rates declined when enhanced enforcement periods ended, they did not decline to pre-enforcement period levels (Dinh-Zarr et al., 2001). Enhanced enforcement may be more effective in suburban and rural areas than in urban locales (Dinh-Zarr et al., 2001). Thus, enforcement would produce an overall increase in safety, since single-vehicle crashes and rural crashes are more common among those who do not wear seat belts (Allen et al., 2006).

Enhanced enforcement or Selective Traffic Enforcement Programs (STEP) may involve more officers on patrol, a focus on issuing more citations during regular patrols, checkpoints for seat belt use, or a combination of these. Sometimes enhanced enforcement is publicized to raise awareness of enforcement, and therefore the perceived risk of being ticketed for not wearing a seat belt. The aim of these methods is not to catch more people not wearing their seat belt, but to increase the public's awareness of the potential for being ticketed. Enhanced enforcement programs produced a 16% increase in seat belt use, followed by a 6% decline in use in the months after the enhanced enforcement program ended (Shults, Nichols, Dinh-Zarr, Sleet, & Elder, 2004). Even with the decline in use post-intervention, the use rate was increased by the intervention.

Enhanced enforcement may increase seat belt use in groups with lower use rates or those who engage in riskier driving behaviors. Even among groups more likely to use seat belts, a higher perceived risk of receiving a ticket is associated with a higher rate of belt use. Women both wear seat belts more often than men and perceive a higher risk of being ticketed, however the effect of perceived risk of being ticketed on seat belt use is stronger in men (Chaudhary et al., 2004). This suggests that increasing the perceived risk of receiving a ticket in lower use groups would produce even greater increase in use rates. Contrary to adults, teens who engage in activities associated with a high risk for motor vehicle crashes, such as driving while impaired by alcohol, may be more likely to fasten their seat belt (Carpenter & Stehr, 2008).

Challenges of measuring safety belt outcomes

There are currently three methods of collecting seat belt use data: self-report, observation, and police-report. Self-report data is often collected using telephone surveys. Observational data is collected by researchers or law enforcement officers who observe (or survey) belt use by vehicle occupants. Police-reported data is included on incident reports of crashes through direct observation by the officer and interviews of the vehicle occupants. The potential for over- or under-reporting of seat belt use exists in all three types of data.

Self-report data may be biased by perceived pressure to use seat belts. For example, individuals may be more likely to falsely report seat belt use when involved in a crash due to fear of receiving a citation (Robertson, 2002). Individuals may also disregard some instances, such as driving short distances, as exceptions to the statement that they always wear their seat belt. In police-report data, there may also be a tendency of police to assume use or non-use of seat belts based on injuries or fatalities rather than direct observation (Robertson, 2002).

Observational data is often considered the gold standard. Every state is required to conduct an annual observational study. Because respondents tend to over-report belt use, observational data has been considered the more accurate source in studies looking at the bias in self-report data (Zambon et al., 2008). In fact, it has been suggested that self-report data can be adjusted by a factor determined by observational data to more accurately reflect actual use (Zambon et al., 2008). However, potential sources of inaccuracy in observational data are instances where observers either missed a case of seat belt use or thought they saw a seat belt in use when in fact one was not.

Data analysis methods may also influence the estimated risk associated with not wearing a seat belt. One example is modeling techniques that do not control for individuals in the same vehicle in a crash during the analysis. Factors in addition to seat belt use may contribute to risk of injury and fatality in a crash, such as occupant age, gender, and seating position relative to the direction of impact, as well as age and type of vehicle, and vehicle speed. Investigators sometimes use outcomes, such as injury scores to make assumptions about missing data in control variables, such as speed, thus assuming a cause from an effect and introducing bias (Robertson, 2002).

Finally, the effectiveness of implementing a seat belt law may be overestimated due to other things happening at the same time, such as public health campaigns providing information on the benefits of seat belt use (Dee, 1998). Conversely, riskier drivers, particularly young males and young male alcohol users with higher risk of crash than other drivers, may also be less likely to adopt seat belt use, producing an underestimation (Dee, 1998) or overestimation (Eluru & Bhat, 2007) of the effectiveness of seat belt use. Additionally, estimates for the efficacy of seat belts may be low due to their very effectiveness. For example, crashes that result in only property damage and are not reported to police or insurance companies may have been injury-free due to the use of seat belts. Despite all these issues, analyses continue to indicate that seat belts are effective in reducing the risk of severe injury or death due to motor vehicle crashes.

Effect of communication campaigns

Another method to promote seat belt use is public health educational campaigns. Not surprisingly, those who more strongly believe that wearing a seat belt is important to one's health also report a higher level of seat belt use (Steptoe et al., 2002); thus,

changing the beliefs one holds about the efficacy of a health behavior can increase the occurrence of that behavior.

Adult rear seat passenger seat belt use involves the commencement of a new behavior supported by enforcement; this kind of campaign was found to be more successful than cessation or prevention campaigns, or when enforcement was not part of the campaign (Snyder et al., 2004). A meta-analysis of campaigns using rewards for seat belt use confirmed that incentive campaigns increased seat belt use 12% in the short-term and 9% in the long-term (Hagenzieker, Bijleveld, & Davidse, 1997). The incentives in the studies in the meta-analysis had to have “material value, such as cash, free meals, prizes that could be won in a contest or lottery.” The magnitude of the short-term gains were higher in small, homogenous groups when the rewards were immediate and when the baseline rates were lower, such as in the absence of a seat belt law (Hagenzieker et al., 1997). However, establishing realistic goals for a campaign is important, given that the more people who already engage in a behavior, the more difficult it will be to produce a change in the remaining population’s behavior (Hagenzieker et al., 1997; Snyder et al., 2004).

Summary

There is no doubt that motor vehicle occupants who choose to buckle up have a much lower risk of injury or fatality in the event of a crash. Unbelted passengers are not only at higher risk of injury or fatality themselves, they become human projectiles that can injure or kill other occupants in the vehicle. Studies have found that vehicle occupants are 2 to 5 times more likely to suffer fatal injuries in a crash when there is an unbelted occupant in their vehicle.

Unlike the front seat, where safety innovations have been numerous, for most vehicles the seat belt remains the sole occupant protection system for the rear seating positions. Seat belts are only effective if vehicle occupants make the decision to use them. Laws requiring seat belt use and the perceived risk of being ticketed for a violation are key factors to motivating people to buckle up.

In conclusion, to have the largest impact on safety for all vehicle occupants and greatest societal benefit, seat belt laws should apply to all passengers in all seating positions, be a primary enforcement law, with a fine amount that will be an effective deterrent and visible enforcement supported by communications strategy.

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Legislative Review

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Introduction

The second component of the policy analysis was a legislative review. Seat belt laws for adult occupants of passenger vehicles across the nation were investigated with additional attention given to states that neighbor Iowa. Three Midwestern states where there have been recent legislative efforts to enhance seat belt policies were identified as case studies. Stakeholders from these states were interviewed by phone about their experiences with the legislative process.

Background

In December of 1984, New York became the first state to pass a law requiring drivers to wear seat belts. Currently 49 states (the exception being New Hampshire) and the District of Columbia have seat belt laws for adults though the specific policies varying greatly from state to state (IIHS, 2013). In 2013, the National Occupant Protection Use Survey (NOPUS) estimated seat belt use across the United States to be 87% (Pickrell, 2014). Belt use has been steadily increasing over the last two decades; the rate was just 58% in 1994 (Pickrell and Ye, 2012). Despite these gains, there is still room for improvement.

The National Highway Traffic Safety Administration (NHTSA, 2008) and the Governors Highway Safety Administration (GHSA) are actively encouraging states to strengthen their seat belt laws to primary enforcement for more seating positions (GHSA, 2013). Primary enforcement allows police officers to make a traffic stop solely for a seat belt violation while seat belt violations under a secondary enforcement law require a traffic stop for violation of another traffic law. The type of enforcement applied significantly affects belt use rates. In states with a secondary law, seat belt use averages 80%, compared to 91% in states with a primary law (Pickrell, 2014).

Increased seat belt use translates to lives saved and injuries prevented. Using data from 2007, when the seat belt use was 82% nationally, the NHTSA Center for Statistics and Analysis estimated that an additional 1,650 lives could have been saved and more than 22,000 serious injuries could have been avoided if every state increased seat belt use to at least 90% (Stames, 2009).

Summary of Seat Belt Laws Across the United States

Although each state sets its own seat belt laws, the federal government attempts to influence legislation through funding incentives and national goals. In response to the U.S. Department of Transportation 1984 rulemaking concerning automatic occupant protection (CDC, 1985), there was a flurry of legislative activity in the late 1980s and early 1990s. By the end of 1990, just 6 years after New York's enacted the first seat belt law, seven other states, including Iowa, also had primary seat belt laws. In the same six-

year period, 29 states implemented secondary laws. By the end of 1995, 49 states and the District of Columbia (DC) had seat belt laws on the books (IIHS, 2013).

Both the Insurance Institute for Highway Safety (www.iihs.org) and the Governors Highway Safety Association (www.ghsa.org) maintain tables of seat belt laws for each state online. Currently, 33 states and DC have a primary seat belt law for front seat occupants and 16 states enforce a secondary law for front seat occupants. New Hampshire is the only state that does not require any adult riding in a motor vehicle to use a seat belt.

Seat belt laws for adults in rear seating positions, if they exist, are often enforced differently than the laws for the front seat. Tables 1, 2, and 3 show the enforcement levels of seat belt laws for rear seat occupants (primary, secondary, and no enforcement, respectively). For states with secondary and no enforcement of rear seat belt laws, the type of enforcement for front seat belt laws is also shown. As shown in Table 1, 17 states and DC have primary enforcement of seat belt laws for rear seat occupants. Table 2 shows the 11 states with secondary rear seat belt enforcement and Table 3 shows the 21 states without rear seat belt laws. Finally, Figure 1 shows a map view of rear seat belt laws for each state.

Table 1. States with Primary Enforcement for Adults in Rear Seating Positions

State	Maximum Fine 1st Offense
Alaska	\$15
California	\$162 (\$20 fine + \$142 in penalties and assessments)
Delaware ¹	\$25
D.C.	\$50
Hawaii	\$92 (including administrative fees)
Illinois	\$25 plus court costs
Indiana	\$25
Kentucky	\$25
Louisiana	\$25
Maine	\$50
Minnesota	\$25, plus approx. \$75 court surcharge (surcharge varies slightly by county)
New Mexico	\$25
Oregon	\$110
Rhode Island	\$40
South Carolina	\$25
Texas	\$50
Washington	\$124
Wisconsin	\$10

¹ Delaware's seat belt law is a civil penalty.

Table 2. States with Secondary Enforcement for Adults in Rear Seating Positions

State	Front seat enforcement	Maximum Fine 1st Offense
Idaho	Secondary	\$10 (drivers <18 pay \$51.50, including court costs)
Kansas	Primary	\$10
Maryland	Primary	\$50
Massachusetts	Secondary	\$25
Montana	Secondary	\$20
Nevada	Secondary	\$25
New Jersey	Primary	\$46 (including court costs) \$10 for rear seat violation
North Carolina	Primary	(\$25.50 + \$135.50 in court costs for primary)
Utah	Secondary	\$45
Vermont	Secondary	\$25
Wyoming	Secondary	\$25 driver; \$10 passenger

Table 3. States without Seat Belt Laws for Adults in Rear Seating Positions

State	Front seat enforcement	Maximum Fine 1st Offense
Alabama	Primary	\$25
Arizona	Secondary	\$10
Arkansas	Primary	\$25 (\$20 city & \$20 county jail fines may be added)
Colorado	Secondary	\$71
Connecticut	Primary	\$92 for >18 (\$50 fine + \$7 fee + \$35 surcharge)
Florida	Primary	\$30
Georgia	Primary	\$15
Iowa	Primary	\$127.50 (including court costs)
Michigan	Primary	\$25
Mississippi	Primary	\$25
Missouri	Secondary	\$10
Nebraska	Secondary	\$25
New York	Primary	\$50
North Dakota	Secondary	\$20
Ohio	Secondary	\$20
Oklahoma	Primary	\$20
Pennsylvania	Secondary	\$10
South Dakota	Secondary	\$25
Tennessee	Primary	\$50
Virginia	Secondary	\$25
West Virginia	Primary	\$25

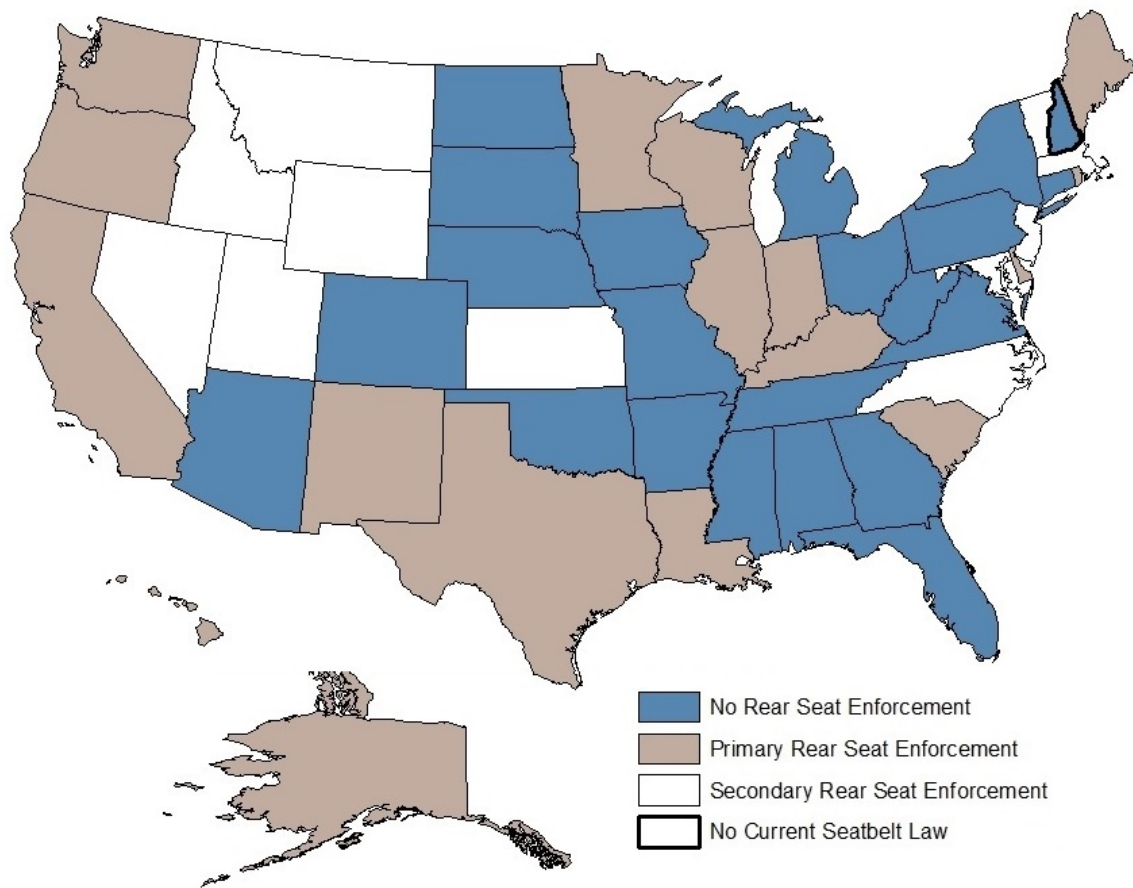


Figure 1. Seat belt laws and enforcement for adult occupants in the rear seat.

According to overall data from the 2012 NOPUS study (Pickrell, 2014), belt use in rear seats has not made any significant gains since 2007 and continues to hover about 10% below use in the front seat. Seat belt use in the back seat specifically was observed to be about 84% in states that require belt use in all seating positions, compared to 67% in states without laws mandating back seat belt use.

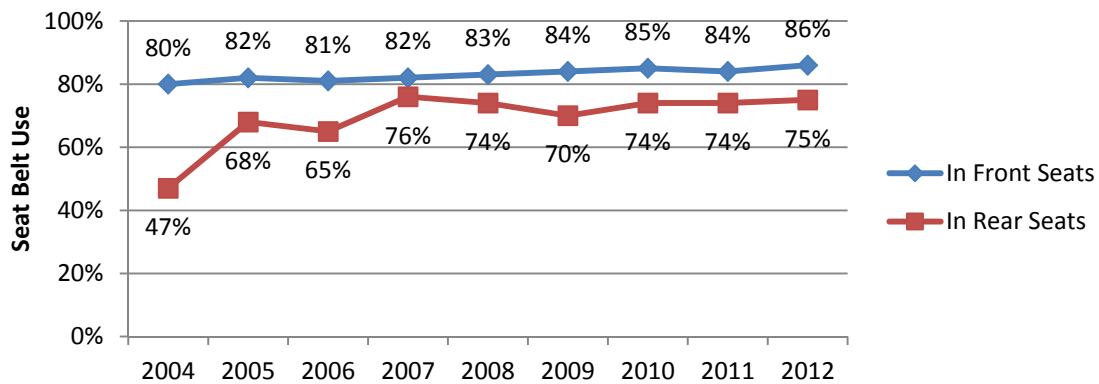


Figure 2. Seat belt use by seating position for occupants 8 and older, 2004-2012 (Pickrell, 2014).

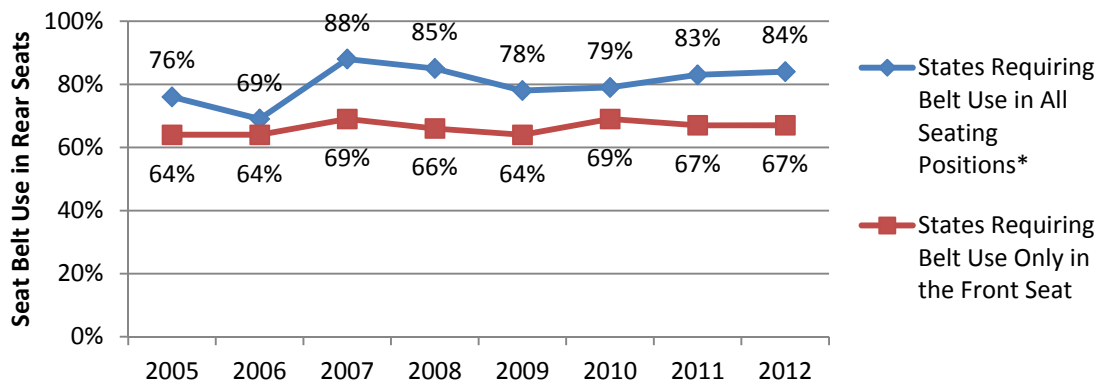


Figure 3. Seat belt use in rear seats by state law type for occupants 8 and older, 2005-2012 (Pickrell, 2014). *This category includes states with secondary enforcement in rear seats.

Midwest Summary

In the Midwest, there is a mix of primary and secondary laws. Minnesota has a primary law enforced for all seating positions with a \$25 fine and around \$75 in court costs. Illinois and Wisconsin also have a primary law for all positions but the fines are only \$25 and \$10, respectively. Missouri has a secondary law for the front seat with a \$10 fine and no law for the rear seat. Kansas has a primary law for the front seat and a secondary law for the rear seat; the fine for both violations is \$10. South Dakota and North Dakota enforce a secondary law for front seat passengers. The fine in South Dakota is \$25 dollars, while North Dakota's fines are \$20. A \$25 fine also accompanies Nebraska's secondary front seat law.

Case Reviews of Legislative Processes in Nearby States

Regionally, efforts to strengthen existing seat belt laws have met with mixed results. This review summarizes the experiences of North Dakota, Minnesota and Nebraska. In all three states, a coalition of government agencies, health care providers and insurance companies have been active in education and advocacy for passage of a primary seat belt law. The three states share regional and demographic similarities but vary in their political climates. In each state, there are forces that contributed to the passage or blockage of a stronger seat belt law. Public opinion is crucial in gauging the sentiment with regard to changing seat belt laws. Conservative political culture has proven to be a barrier to passage of a primary seat belt law for North Dakota, Nebraska and, to a lesser extent, Minnesota.

Minnesota

Minnesota's initial seat belt law, which went into effect August 1, 1986, was a secondary enforcement law and only required seat belts for front seat occupants. Nonetheless, observed belt use by front seat occupants was relatively high at 87.8% and 86.7% in 2007 and 2008, respectively.

After proposals for a primary seat belt failed in both 2007 and 2008, Minnesota adopted a primary seat belt law for all passengers in 2009. Between 2007 and 2009 when changes to the law were being considered, public support in favor of adopting the primary law varied from 62-70%. Despite the public support, there were two sources of opposition. The first came from legislators that represented rural constituencies. They believed the government would overstep its bounds by allowing law enforcement to police seat belt use in vehicles that were otherwise following the law. The second source was from lawmakers in urban districts that worried the primary law would encourage racial profiling. These concerns arose mainly in Minneapolis, where profiling by the police department was and continues to be a hot-button issue. Then-Governor

Tim Pawlenty neither supported nor opposed the law which went into effect on June 9, 2009.

After the law was implemented observed seat belt use in Minnesota increased to 92.3% and 92.7% in 2010 and 2011, respectively. An analysis conducted by the Center for Excellence in Rural Safety at the University of Minnesota School of Public Affairs (Douma & Tilahun, 2012) estimated there were 68 (SD = 34) fewer fatalities in the two years after the new law went into effect. This represents 10% fewer fatalities than predicted by the motor vehicle injury trends before the law went into effect. The analysis also estimated there were 321 (SD = 60) or 16% fewer incapacitating injuries. Public support for the primary seat belt law actually increased after it was implemented, with 75% of those surveyed by phone in 2010 agreeing that police should be allowed to stop a vehicle for only a seat belt violation. Despite the high level of public support and the decrease in injuries and fatalities, in 2011 the Minnesota House approved an amendment to repeal the primary seat belt law.

North Dakota

Advocates for a primary seat belt law in North Dakota have faced a more contentious path than their counterparts in Minnesota. North Dakota was one of the last states to implement a seat belt law (only South Dakota and Maine were later) and currently enforces a secondary law for drivers and front-seat passengers that went into effect on July 14, 1994 (IIHS, 2013). In 2013 the Upper Great Plains Transportation Institute at North Dakota State University reported an average statewide seat belt use rate of 77.7%, but the rates for individual counties included in the sample ranged from 54.4% to 88.4% (Vachal, Malchose, Kubas, & Benson, 2013).

In February 2013, the North Dakota House considered a proposal that would enact a primary seat belt law for front seat passengers (Wetzel). Opponents of the bill cited the potential for violation of civil liberties if police could initiate a traffic stop solely for a seat belt violation and made the argument that requiring motorists to wear seat belts was an unwarranted intrusion of the state into citizens' health care decisions. Proponents, meanwhile, argued that because all citizens have to bear the cost of fatalities and major injuries, failure to wear a seat belt is not a victimless crime. One representative stated that an unbelted passenger "becomes a loose cannon in a vehicle involved in an accident" causing injury to other passengers who are using seat belts (Preskey, 2013). The North Dakota governor did not publicly support or oppose the proposed bill. The bill for the primary seat belt law was defeated with a vote of 52-40.

The North Dakota Department of Transportation has been introducing bills for primary seat belt laws since the mid-1980s. Thus far, in North Dakota there is neither the public support nor the political will to pass a primary law.

Nebraska

Nebraska was the 42nd state to implement a seat belt law. The secondary enforcement law for front seat passengers went into effect January 1, 1993 (IIHS, 2013). In 2011 the observed seat belt use rate was 84.2% (NHTSA, 2013).

In the 2014 legislative session, Nebraska lawmakers will consider a change from a front seat secondary law to a front seat primary law. Nebraska is not as urban as Minnesota, nor is it as rural as North Dakota. The state still faces strong opposition from mostly rural legislators who believe the bill would erode personal freedom. The bill is currently in committee, and while it is on the docket for the upcoming session, committee chairs have not selected it as a priority issue. Moreover, the current governor believes the existing law is sufficient.

A significant barrier facing proponents of primary enforcement in Nebraska is the movement to repeal the state's helmet law for motorcyclists. The coalition for primary enforcement, mentioned at the beginning of this section, is fighting on two fronts and must choose to spend political capital between advocating for an enhanced seat belt law or protecting the helmet law already in place.

Summary

The 2012 National Occupant Protection Use Survey found that seat belt use in rear seats was 17% higher in states with rear seat belt laws compared to those without such laws (Pickrell, 2014). While Iowa is among the majority of states with a primary enforcement seat belt law for front seat occupants and was one of the earliest states to adopt such a law, it is also one of 21 states that do not require adults riding in the rear seat to wear a belt. In the Midwest, Minnesota, Wisconsin, and Illinois all have a primary belt law for rear seat passengers while Kansas has a secondary enforcement law for those in the back seat.

In 2009, Minnesota strengthened its seat belt law from secondary enforcement for the front seat occupants to primary enforcement for all seating positions. Attempts to pass primary seat belt laws in North Dakota and Nebraska in recent years have not been successful. Stakeholders from these states were interviewed by phone and shared their experiences, which were found to be very similar. In summary,

- Typical members of state coalitions attempting to enhance seat belt law provisions have included representatives of governmental agencies, health care providers, and insurance companies.
- Strengthening seat belt laws is commonly framed as an issue of public health.
- Most commonly cited reasons for non-support of enhanced seat belt laws included violation of civil liberties, independence, and personal choice.

- In some cases, safety advocates may make a decision to focus on preserving existing state policies (e.g. helmet use laws) rather than using limited resources on encouraging new/strengthened provisions of seat belt laws.
- A lack of executive support does not preclude the passage of stronger laws.
- Political climates state to state can be just as important as evidence-based research and well-articulated arguments.

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Crash data analysis

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Introduction

The third component of the policy analysis was an analysis of the Iowa crash data. The analysis considered how fatalities and injuries vary by crash severity and belt use/non-use. Several other planned research questions concerning belt use/non-use for drivers and passengers in crashes of all severity levels could not be answered because belt use/non-use is frequently not recorded (“NR”) in the crash report for vehicle occupants who were not injured in the crash.

Methodology

The Iowa crash data is comprised of several separate datasets that include variables concerning the **crash** (e.g., when and where the crash occurred, the number of vehicles and vehicle occupants involved, manner of crash or collision, the environmental conditions), the **vehicle(s)** (e.g., driver information, vehicle type, make, model, damage, point of impact), and the **persons** involved (age, gender, seating position, occupant protection status, and injury). Data from reportable crashes that occurred in Iowa from 2001-2012 were considered in this analysis. Data from 2013 was also obtained in early 2014. Access to the data was obtained through the Injury Registry at University of Iowa’s Injury Prevention Research Center. The data did not contain any personal information.

Results

Availability of seat belt data

Data from the most recent full year available (2012) was inventoried at the person level for all individuals who were occupants of passenger vehicles to quantify the availability of occupant protection data. The variable is coded by the investigating officer as Yes (lap and shoulder belt used), No (no occupant protection used), Partial (only lap or only shoulder belt used), Child restraint system, Unknown, or Not Reported. In this inventory, when the data indicated there were more occupants in a vehicle than reported in the Person data, those individuals were counted as “Not reported.”

As shown in Figure 1, occupant protection data is unknown or not reported more than half the time for individuals involved in a crash that did not result in any injuries. As the level of most severe injury sustained in the crash increases, the quality of the seat belt data improves. Nonetheless, occupant protection data is unknown or not reported more than 20% of the occupants involved in crashes that resulted in a fatality.

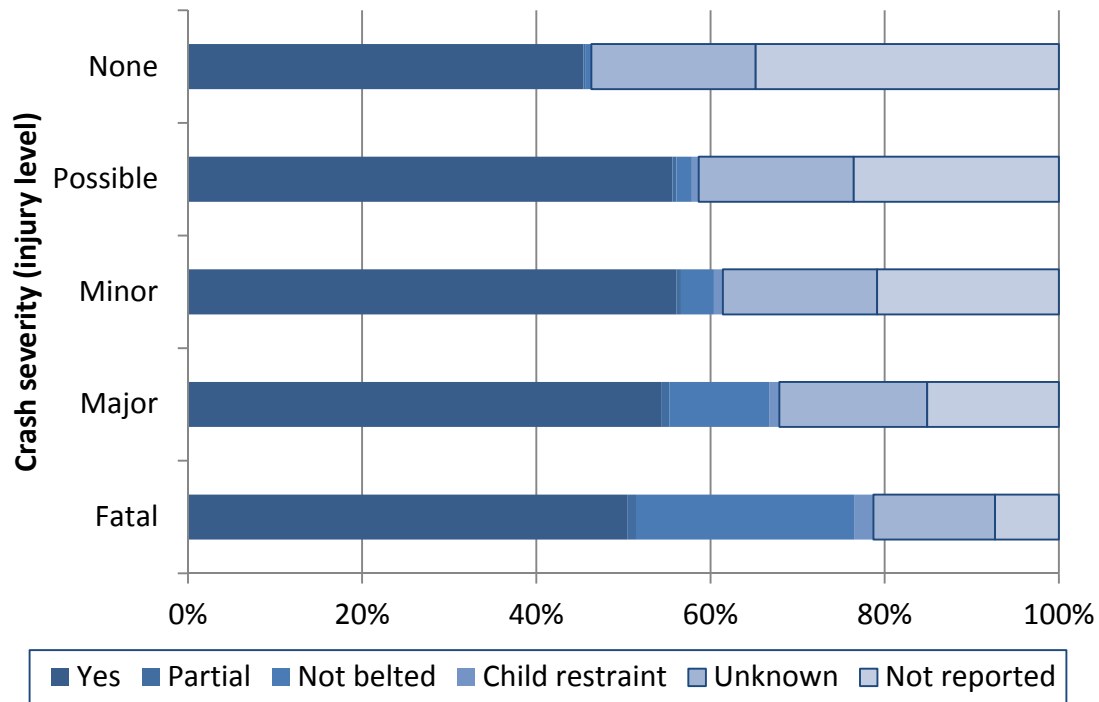


Figure 1. Content of occupant protection field in the Iowa crash data for 2012.

Belt use of fatally injured occupants

The occupant protection status of vehicle occupants age 18 and older and those of unknown age who were fatally injured in a motor vehicle crash was considered by seating position. Only individuals for which occupant protection status was known (i.e., coded as Yes or No) were included. As shown in Figure 2, drivers who were fatally injured were belted about half the time. Fatally injured front seat passengers were belted a little more than half the time. One possible explanation of this finding that has not yet been corroborated is males are less likely than females to buckle up but are more likely to be driving when individuals of each gender are present in the vehicle. In contrast to front-seat fatalities, on average only 17% of fatally injured rear seat passengers were belted. Although the overall trend of seat belt use for fatally injured rear seat passengers is gradually increasing over time, belt use for this group lags front seat passengers by 40%.

Since 2001, adult fatalities in rear seating positions have varied from 10 to 20 fatalities per year. Figure 3 shows the number of these fatalities each year since 2001 by occupant protection status. On average each year there are 13 rear passenger fatalities where occupant protection was not used.

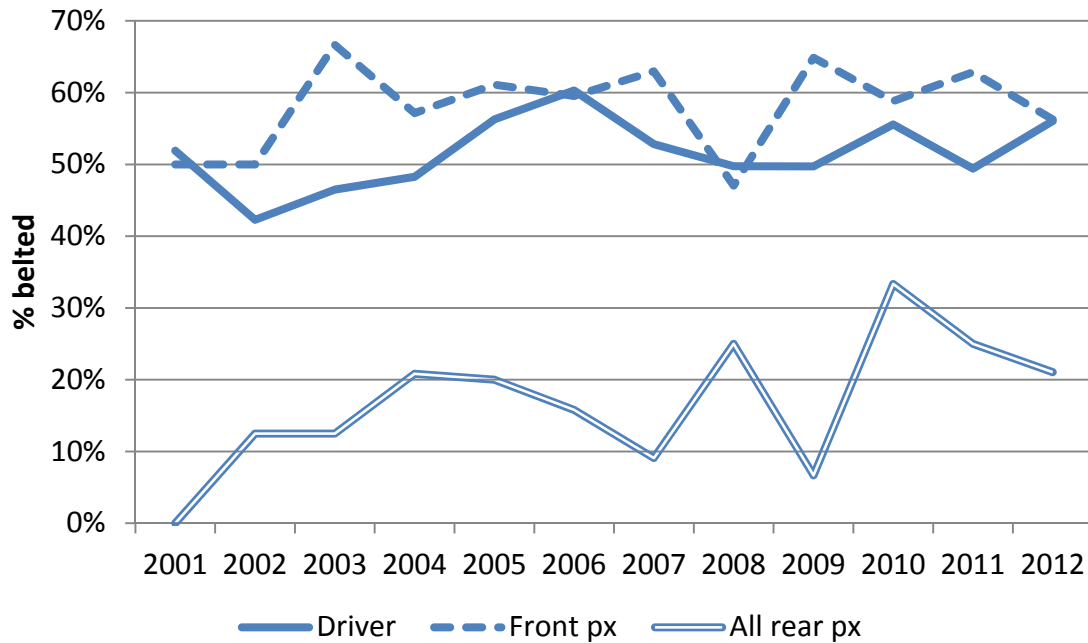


Figure 2. Percent of fatally-injured adult vehicle occupants with known occupant protection status who were belted by seating position.

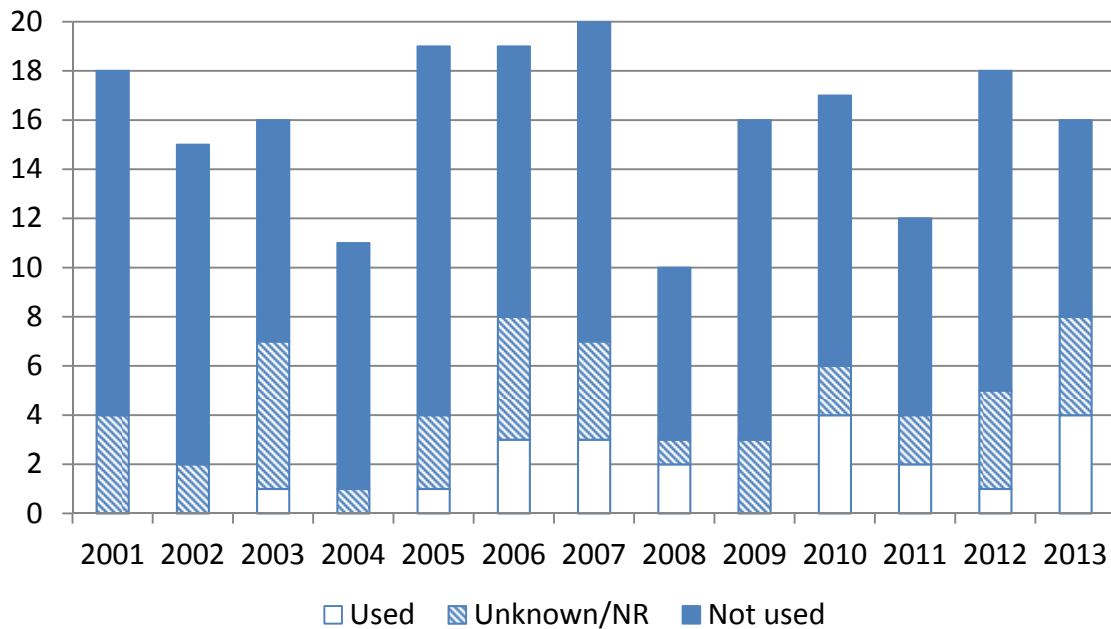


Figure 3. Count of fatally-injured adult vehicle occupants in rear seating positions by occupant protection status.

Summary of crash characteristics of adult fatalities in rear seating positions

Data from 2006-2013 for crashes resulting in major injuries to adult occupants known to be sitting in rear seating positions were examined for several factors shown to be correlated with non-belt use, specifically full or partial ejection of the occupant from the vehicle; a driver involved in the crash was under the influence of alcohol, drugs, or medication; or the injured occupant was under age 25. The factors were tabulated separately for fatal and non-fatal injuries, and for single- and multi-vehicle crashes, as shown in Tables 1 and 2.

Overall only 15% of the fatally injured adult rear-seat occupants were belted. The belt use rate for fatalities from single vehicle crashes (7%) was one-third the rate from multi-vehicle crashes (21%). Ejection of the rear seat occupant from the vehicle occurred in 60% percent of the fatal injuries incurred in single vehicle crashes compared to 23% for multi-vehicle crashes. Age under 25 and drivers under the influence each occurred in about 30% of the fatalities and did not vary by number of vehicles involved in the crash. All of the 50 rear-seat occupants who were fatally injured and ejected from the vehicle were unbelted. Similar trends for seat belt use and ejections were observed for adult rear seat occupants suffering major non-fatal injuries. Drivers under the influence and age under 25 were associated with major non-fatal injuries for rear occupants more often in single vehicle crashes about twice the rate as in multi-vehicle crashes.

Table 1. Characteristics of crashes resulting in fatal injuries to adult occupants in rear seating positions, 2006-2013

	All crashes	Single vehicle	Multi-vehicle
Adult rear seat fatalities	128	55	73
Seat belt used	19 (15%)	4 (7%)	15 (21%)
Ejections	50 (39%)	33 (60%)	17 (23%)
Drug/Alcohol/Medication	38 (30%)	18 (33%)	20 (27%)
Age < 25	39 (30%)	18 (33%)	21 (29%)

Table 2. Characteristics of crashes resulting in major non-fatal injuries to adult occupants in rear seating positions, 2006-2013

	All crashes	Single vehicle	Multi-vehicle
Adult rear seat major injuries	590	316	274
Seat belt used	132 (22%)	49 (16%)	83 (30%)
Ejections	119 (20%)	102 (32%)	17 (6%)
Drug/Alcohol/Medication	123 (21%)	89 (28%)	34 (12%)
Age < 25	263 (45%)	176 (56%)	87 (32%)

Acknowledgments

The author is grateful Tracy Young of the University of Iowa Injury Prevention Research Center and Michael Pawlovich from the Iowa Department of Transportation Office of Traffic and Safety for their assistance with obtaining access to the crash data.

Opinion Survey

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Introduction

The fourth component of the policy analysis was a public opinion survey of Iowa's seatbelt laws. The objective of the phone survey was to determine the level of support among adult residents of Iowa for modifying the state's seat belt policies to require that all passengers are belted.

The statewide survey was conducted by telephone from October 3–November 6, 2013. The PPC retained the Iowa Social Science Research Center (ISRC), a division of the PPC, to implement the survey. The ISRC used random digit dial (RDD) landline and cellular samples provided by Survey Sampling International (SSI) to conduct the study. It took participants about five minutes to answer all survey questions. Sample results included 1,029 completed interviews; the cooperation rate was 41%, and at least one full interview was obtained from each of Iowa's 99 counties.

Survey results indicated broad support for a proposed law requiring that all rear seat passengers use seat belts. Approximately 65% of respondents voiced support for such a law. This held true across all demographic variables, including high vs. low population counties, male vs. female, and older vs. younger respondents.

Methods

Interview script

Project staff at the PPC worked with ISRC personnel to design the survey instrument. The script contained 19 questions including consent, eligibility screening questions, and skip patterns. It took approximately five minutes to administer. The questionnaire and other study procedures were approved by the University of Iowa (UI) Institutional Review Board (IRB). See Appendix A for the entire interview script.

The first questions in the interview script determined whether the individual was eligible to participate in the survey; they established that participants resided in Iowa, confirmed their county of residence and that they were at least 18 years of age. Then the interviewer informed the individual about the scope and length of the interview and asked the individual if they were willing to complete the survey. The first part of the survey asked the respondent about their personal seatbelt when they were driving and when they were passengers in both the front and rear seats. The second part of the survey asked the respondent his or her opinion of a proposed law to make seatbelts mandatory for all rear-seat passengers. Participants were asked if such a law would cause them to more often use a belt when riding in the back seat, whether they felt the law should be changed, and how strong their feelings were on the subject.

Sample selection

To be eligible to participate in the seatbelt survey, respondents had to: (1) reside in Iowa; and (2) be 18 years of age or older. To conduct the statewide phone survey of adult Iowa residents, the ISRC used random digit dial (RDD) landline and cellular samples provided by Survey Sampling International (SSI), which included batches of numbers in each county in Iowa.

According to the October 2012 National Health Statistics Report *Wireless Substitution: State Level Estimate from the National Health Interview Survey, 2010-2011*, 31.9% of Iowa residents 18 and older live in wireless-only households. As a result, the ISRC used a split of 70% landline and 30% cellular phone numbers as a balanced sample approach for reaching the target population. The sample was downloaded into an ISRC access-controlled project folder. Only specific IRB-approved project staff was allowed to access the sample folder.

In addition to representing all Iowa counties, the sample was stratified by population into high, mid, and low population counties. Ten counties were classified as high (population over 70,000), 25 as mid-level (population between 20,000-50,000), and 64 as low population (less than 20,000). The sample stratification was derived using 2012 Census estimates. See Figure 1 for the distribution of Iowa's population by county.

Survey Implementation

The ISRC call center used a computer-assisted telephone interviewing system (CATI) for data collection in this survey (WinCati, Sawtooth Technologies). Once loaded into the CATI system, the phone numbers were attempted in a random order (as dictated by the CATI randomization feature). There was a maximum of four attempted calls per number. Calls were made between 9:00 am–9:00 pm Mondays through Thursdays, 9:00 am–5:00 pm on Fridays, 10:00 am–4:00 pm on Saturdays, and 12:00 pm–4:00 pm on Sundays.

For each call, staff identified the number as belonging to a landline or cellular telephone. If the number was a landline, the CATI system dialed it automatically. Federal law prohibits auto-dialing of cell phones, so call center staff manually dialed those numbers. The protocol for wireless numbers also required interviewers to ensure that respondents were not driving a vehicle and were in a safe place to talk on the phone before beginning the survey.

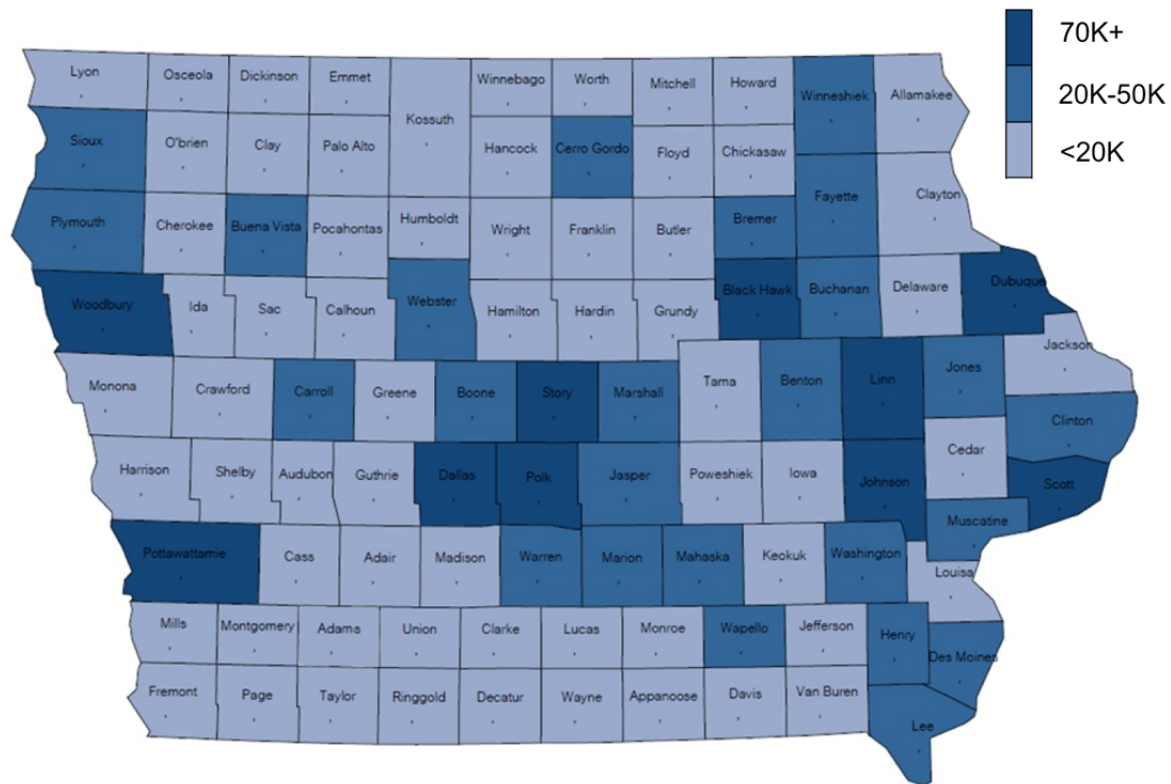


Figure 1. Distribution of Iowa population by county

Results

The ISRC call center attempted to contact 10,928 numbers. The interviewers reached an individual 25% of the time (not counting calls that connected to government offices or businesses). In 5% of those calls, the individual was ineligible or unable to participate due to illness, competency, or language barriers. Just over half the calls to individuals or households were met with refusals to participate (53%). The ISRC call center completed 1,077 interviews, for an overall response rate of 41%. Approximately 36% of the interviews were conducted on cell phone lines. The final disposition table describing the outcome of each number attempted is available in Appendix B.

Results were weighted to adjust for disparities between low and high population counties, as well as for gender and age (it has been shown that RDD phone surveys, even those that include cell phones, tend to over-represent older females). To calculate the weights, expected percentages for the low, mid, and high population levels were 25%, 25% and 50%, based on the county populations in each of the three strata (Table 1). Expected percentages for gender and age were taken from the US Census Bureau's 2010 demographic profile of Iowa.

Table 1. Respondents by age, gender and county population strata

Age	High	Mid	Low	Total
18-29	34	34	24	92
Female	20	21	11	52
Male	14	13	13	40
30-39	44	24	42	110
Female	27	13	27	67
Male	17	11	15	43
40-49	47	55	43	145
Female	28	31	29	88
Male	19	24	14	57
50-59	70	68	71	209
Female	41	42	45	128
Male	29	26	26	81
60-69	82	79	79	240
Female	42	58	46	146
Male	40	21	33	94
70+	64	93	118	275
Female	38	69	89	196
Male	26	24	29	79
DK/Ref	4	2		6
Female	1	1		2
Male	3	1		4
Grand Total	345	355	377	1077

Responses to interview questions

Iowans reported high rates of compliance with current seat belt laws. When driving, over 90% in all three population levels reported using a belt *always* or *most of the time* (Figure 2). This rate remained high—over 90%—for adults riding as passengers in the front seat (Figure 3). As can be seen in the figures, although the rates were slightly lower in low population counties compared to high population counties, they remained high in both.

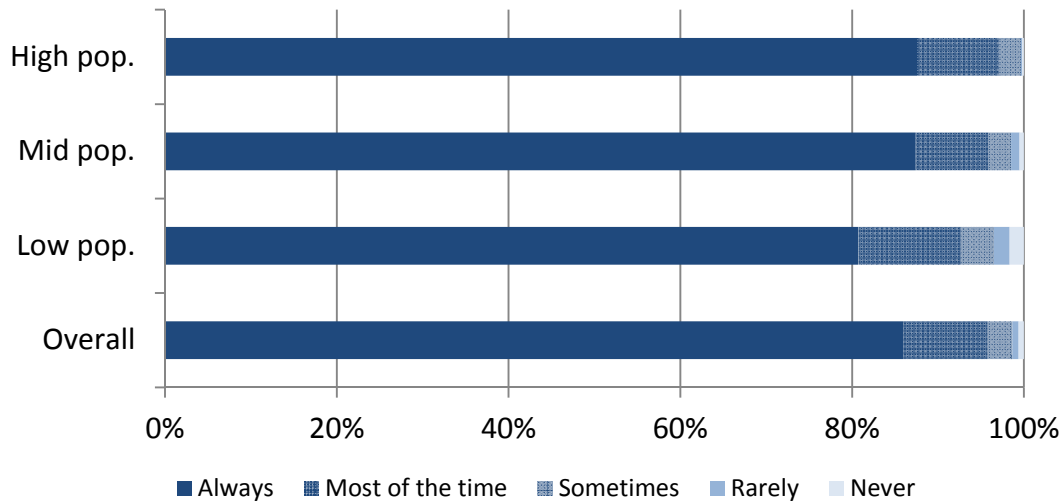


Figure 2. Reported frequency of seat belt use when driving

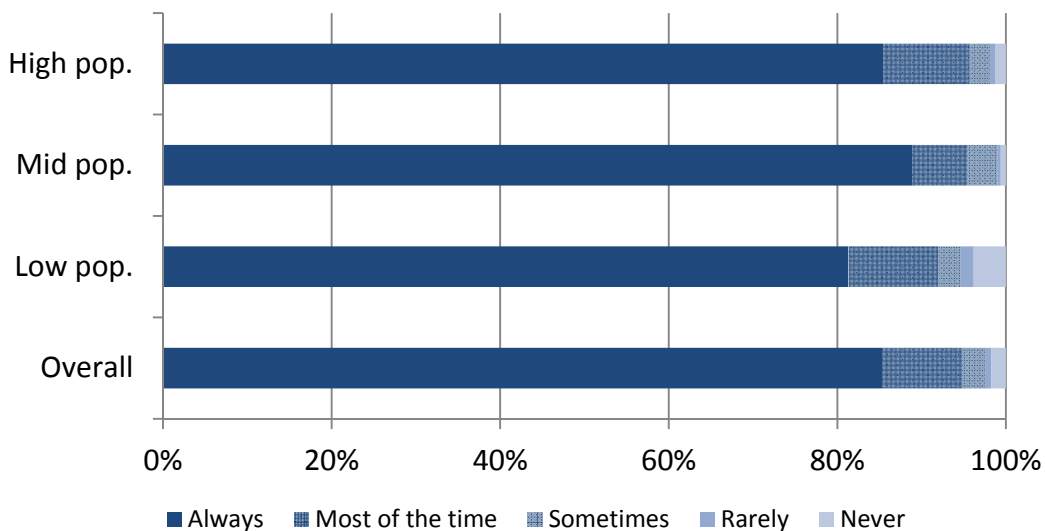


Figure 3. Reported frequency of seat belt use when a passenger in the front seat

Rates of seat belt use dropped significantly when respondents were asked about riding as a passenger in the rear seat of a vehicle. As rear-seat passengers, less than 40% of lowans reported that they *always* use a belt. Meanwhile, approximately 40% of respondents from low population counties and over 30% of those from high population counties reported that they never or rarely wore a belt when riding in the back seat (Figure 4).

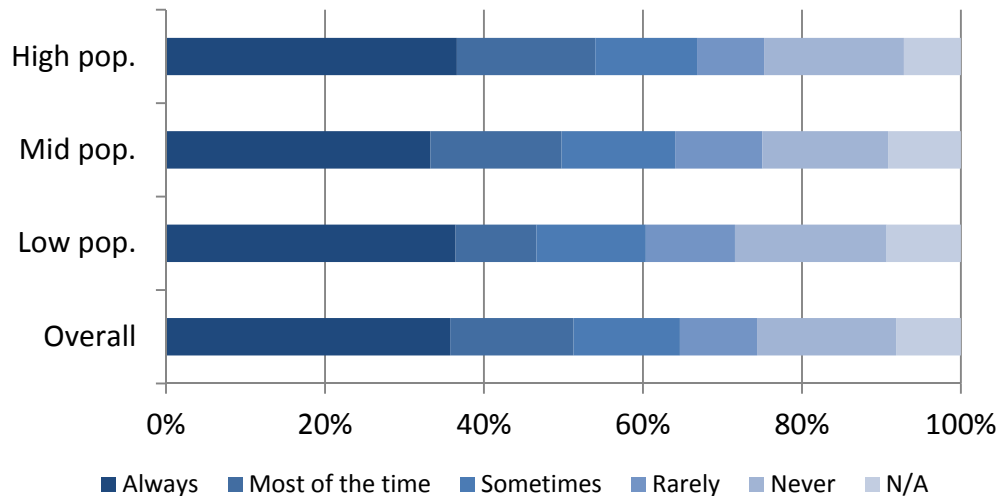


Figure 4. Reported frequency of seat belt use when a passenger in the rear seat

Figure 5 presents the percentage of respondents who reported *always* using a seat belt when they were passengers in the front seat to those who always did so when riding in the back. As can be seen in the figure, respondents who always use a belt in the front seat are 45-56% less likely to do so when riding in the back.

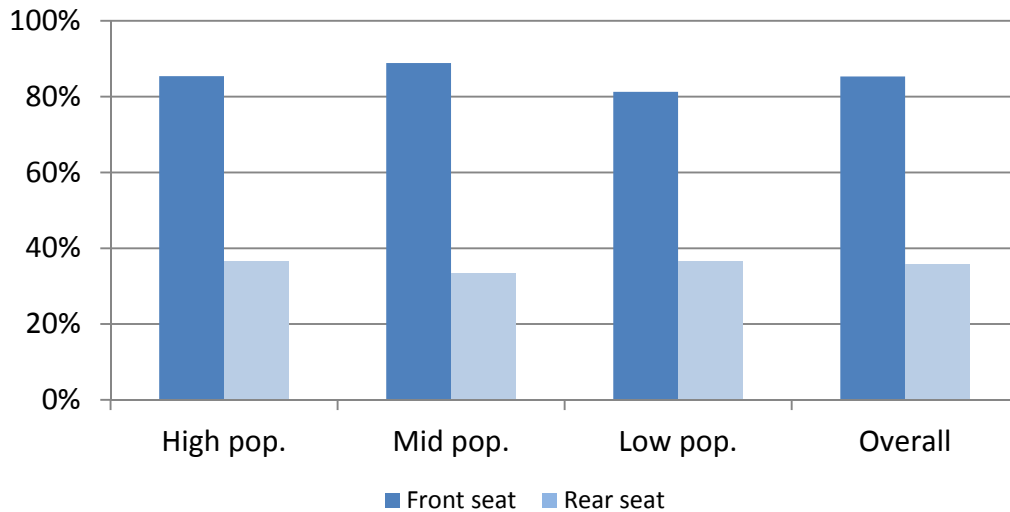


Figure 5. Percent reporting they always use a seat belt when a passenger by seating position

Respondents were then asked the reasons why they did not use a belt when riding in the rear seat always or most of the time. Reasons varied from forgetting to use belt, to low perceived risk to discomfort. The most common responses are summarized in Table 2. However, when asked if they would use a seat belt more often in the rear seat if the law required it, approximately 80% of respondents said that they would (Figure 6).

Table 2. Reasons for not always using a seat belt as a passenger in the rear seat

Reason	%	n
Forget (don't think about it, don't pay attention)	12	65
Law (it's not the law, not required to, don't have to)	12	64
Rear seat belts are difficult to access and use	11	58
Not comfortable/ not enough room/ desire to move around	15	82
Not important, not needed, safe enough without belts	12	64
Riskiness of the situation (length of trip, "in town," who the driver is)	11	60
Not in the back seat very often		36
Not a habit, not used to it, didn't grow up with seat belts		21
Don't want to, don't like seat belts, don't feel like using it		15
Depends on what vehicle they are in		11
Convenience, get in and out of the vehicle frequently		9
Have a right not to use a seat belt		9
Lazy		9

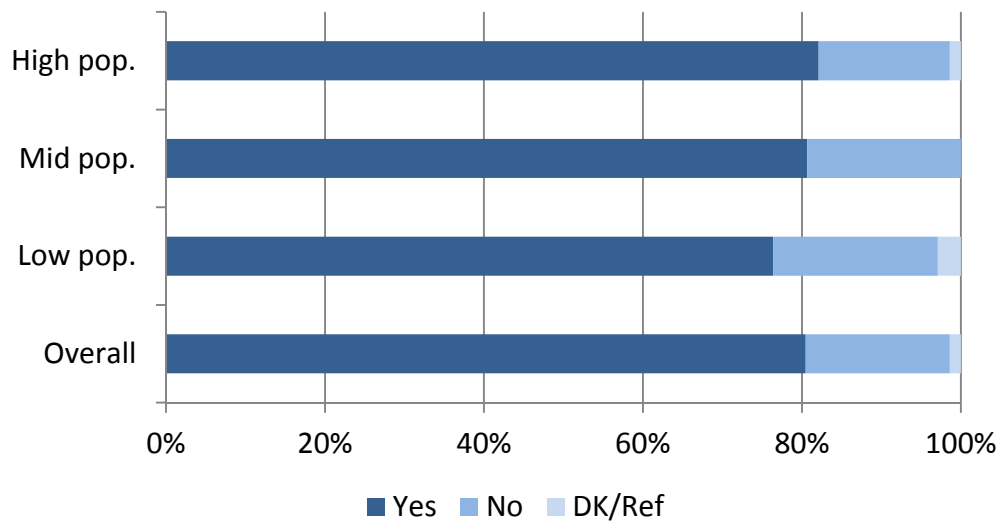


Figure 6. Whether respondent would use a seat belt in the rear sea more often if it was required by law

Opinions about possible change of Iowa seat belt law

When asked if they thought Iowa law should be changed to require all rear seat passengers to use seat belts, a majority of respondents, over 60% overall, said yes the law should be changed (Figure 7). Again, support was slightly lower in low population counties (57%) than in mid (64%) or high-population (64%) counties.

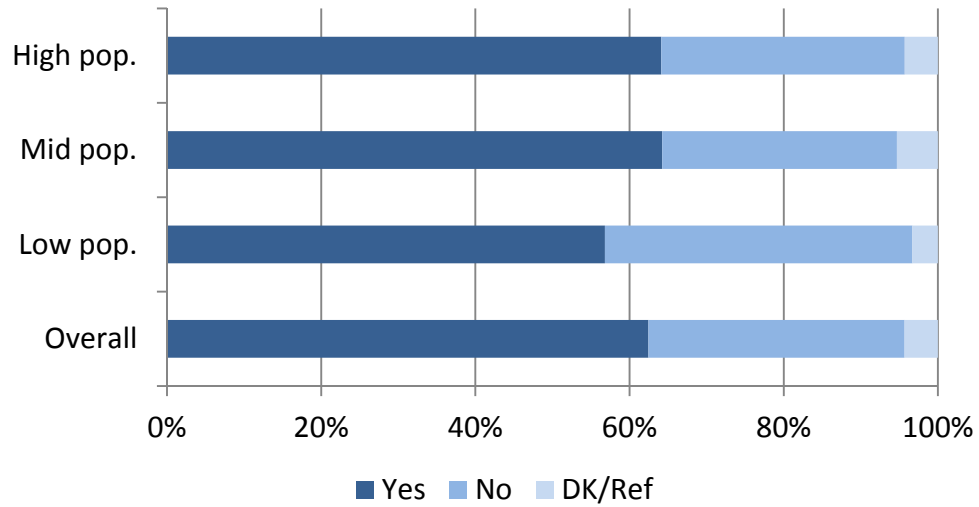


Figure 7. Whether respondent thought Iowa law should be changed to require rear seat passengers to use seat belts

A majority of those who thought the law should be changed—more than 90%—felt strongly or somewhat strongly about this belief (Figure 8).

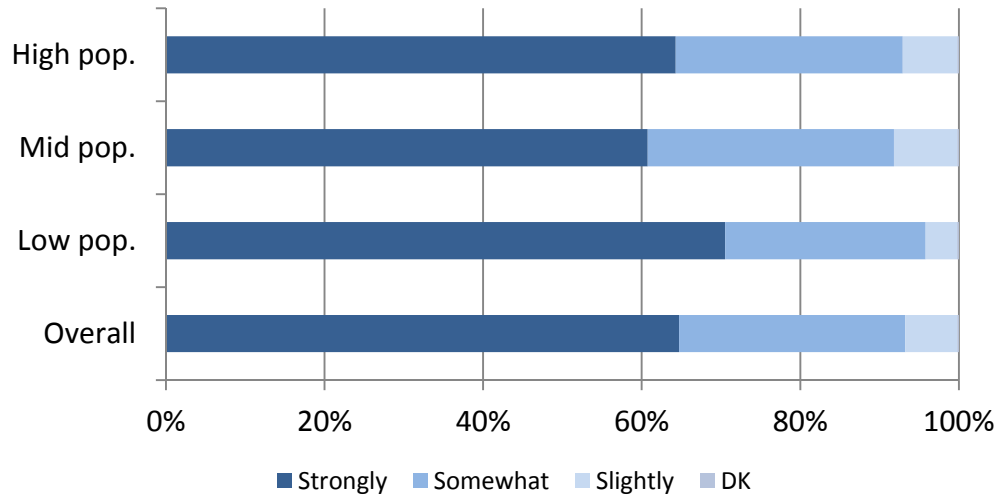


Figure 8. Strength of support for change in law

Further analysis revealed that a significantly higher proportion of female respondents supported the possible seat belt law change than male respondents. This was true across all age groups, but the gender difference was greatest among females/males ages 18-29 and 50-59 (Figure 9). There was less variation in the gender difference across low vs. high population levels, although females in low population counties were slightly less likely to say they would support the possible policy change (Figure 10).

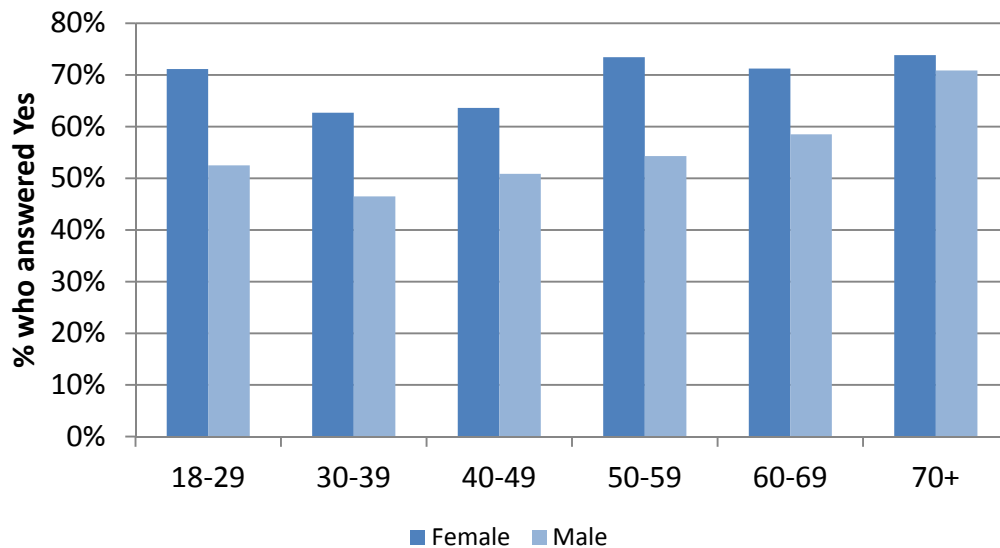


Figure 9. Support for change in law by age and gender

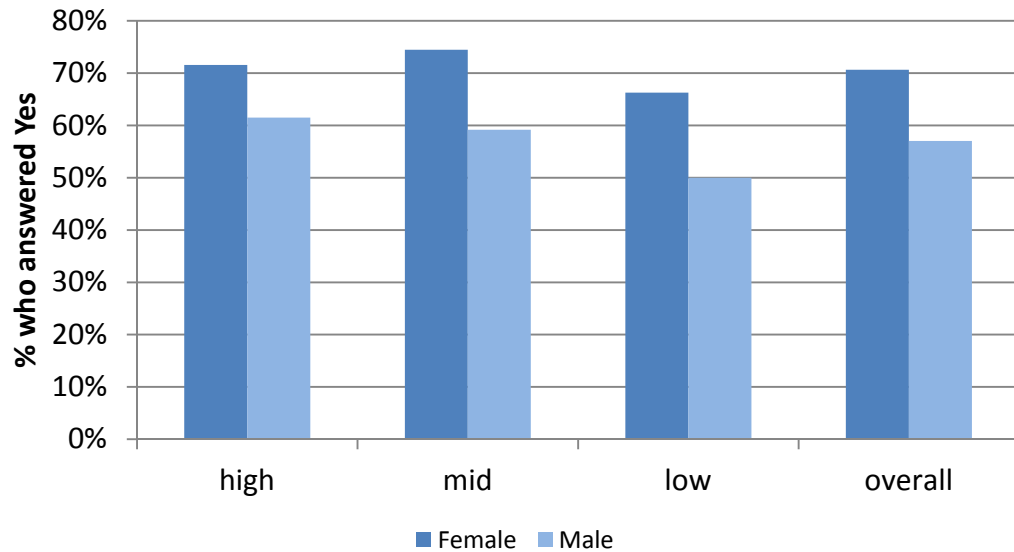


Figure 10. Support for change in law by gender and population strata

Overall, the survey found a high level of support for a change in seat belt policy across all the demographic factors tested. When age and population strata were considered together, support did not drop below 50% for any group except those aged 30-39 living in low population counties (Figure 11).

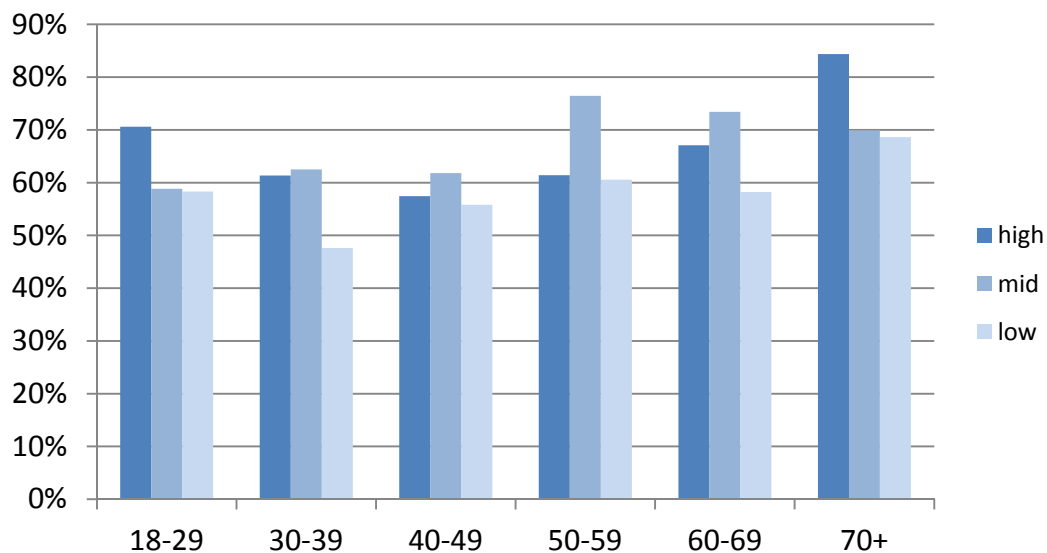


Figure 11. Support for change in law by age and population strata

Summary

There is at present no mandate that adults riding in the rear seat of vehicles in Iowa must use a seat belt. As this issue is currently under consideration, the Iowa DOT contracted the UI PPC, the ISRC and the IPRC to conduct a public opinion survey regarding an “all passengers belted” amendment to the Iowa law. The statewide public opinion survey was conducted October 3–November 6, 2013.

Survey results indicated that by and large, Iowa drivers are a law-abiding group. Over 90% of respondents reported that they always or mostly use a seat belt when driving or riding in as a passenger in the front seat, as required by Iowa’s current law. These rates were slightly lower in low population counties.

When respondents were asked about seat belt use as rear seat passengers, however, rates of use dropped precipitously. Less than 40% reported always using a belt, while approximately 40% in low population counties and about 35% overall said they rarely or never use a belt in the rear seat. Respondents who always wore a belt in the front seat were 45-56% less likely to do so when riding in the back.

Reasons given for not using a belt in the back included not thinking about it, low perceived risk of a crash, and because it was not required under the law. When asked if they would use a seat belt in the rear seat more often if the law were changed to require it, approximately 80% of respondents said that they would.

Respondents were asked if they thought Iowa law should be changed to require all back seat passengers to use seat belts. More than 60% of respondents overall said that yes, the law should be changed. Response rates were higher for high and middle-population counties (about 63%) than for lower population counties (about 57%). Among the group that responded that the law should be changed, over 60% felt strongly that such a change should be enacted; surprisingly, respondents from the low population counties had the highest response rate for feeling strongly that the law should change (close to 70%). An additional 15-25% felt *somewhat strongly* about the proposed change.

In general, female respondents were more likely than males to voice support for the enhanced law. This was true for all six age groups, with females ages 18-29 and 50-59 showing the most disparity in support compared to males.

In general, support for amending the Iowa policy to require all rear seat passengers to use seat belts was strong, with approximately 65% of respondents supporting the change. A significant fraction of the respondents cited that they do not always use seat belts in the rear seat because the law does not require it; however, if it were the law, they would use seat belts more often.

Conclusion

Seat belts are 60% effective at reducing fatalities for rear seat occupants (Zhu et al., 2007). While numerous advances in occupant protection for front seat occupants have been implemented in vehicles produced since 2000 – so much so, the rear seat is no longer the safest place for an adult occupant to be during a motor vehicle crash—the seat belt remains the primary safety system for those in rear seating positions. If an adult must sit in the rear seat, buckling up is critical to prevent him or her from becoming a dangerous projectile inside the vehicle cabin during a crash. Belted passengers riding with an unbelted passenger are 2 to 5 times more likely to suffer fatal injuries in a crash relative to when all occupants are using seat belts.

Iowans as a whole do a superb job of observing the current seat belt laws. Belt use rates for front seat occupants in Iowa have been between 90% and 94% since 2006. In a survey of more than 1000 Iowans, 85% said they *always* use a seat belt when riding in the front seat, but only 36% always do so when they ride in the back seat. When asked why they don't always buckle up in the back seat, the most common responses were they forget to put their belt on (12% of respondents) and because it is not the law (12%).

Between 2006 and 2013, 128 adult occupants age 18 and older known to be riding in rear seating positions suffered fatal injuries in motor vehicle crashes. Only 15% were using seat belts. Fifty of these occupants were ejected from the vehicle they were riding in; *none* of these fatalities were using a seat belt. In contrast, adults who suffered fatal injuries in front seating positions were buckled up about 55% of the time.

Iowans surveyed by telephone widely and strongly support strengthening Iowa's seat belt law — 62% said Iowa law should require all rear seat passengers to use seat belts. Four out of five respondents said they would use seat belts more often when sitting in the rear seat if it was the law. If the law was implemented and Iowans were 80% compliant with the law, it is expected that rear seat fatalities would decrease about 48%, from 13 to 7 fatalities annually.

Appendix A: ISRC Seatbelt CATI Script

INTRO

Hello, my name is [INTERVIEWER NAME] and I am calling from the Social Science Research Center at the University of Iowa. We are calling to ask selected adults 18 years or older in Iowa for their assistance with a 5-minute survey about their attitudes regarding seat belt laws. (skip to CELLINTRO for cellular phone number; skip to LANDLINEINTRO for landline phone number)

Question CELLINTRO

Are you 18 years of age or older?

1. **YES** (skip to CELLSAFE1)
7. **NO** (skip to CLOSE)
8. Don't know (skip to THANKSBYE)
9. Refused (skip to THANKSBYE)

Question CELLSAFE1

Are you driving a vehicle right now?

1. **YES** (skip to ISDRIVING)
2. **NO** (skip to CELLSAFE2)
8. Don't know (skip to THANKSBYE)
9. Refused (skip to THANKSBYE)

[NOTE: IF DRIVING, EVEN IF RESPONDENT WANTS TO CONTINUE, INSIST THAT STUDY RESEARCHERS HAVE PRE-DETERMINED THAT NO INTERVIEWS OCCUR WHILE RESPONDENT IS DRIVING].

Question CELLSAFE2

Are you in a place where you can safely talk on the phone and answer my questions?

1. **YES** (skip to FROMIOWA)
2. **NO** (skip to NOTSAFE)
8. Don't know (skip to THANKSBYE)
9. Refused (skip to THANKSBYE)

Question **LANDLINEINTRO**

In order to choose a random person with whom I should speak, I need to know which adult, 18 years or older, in your household had the most recent birthday.

1. **Continue Interview** — eligible respondent is on the phone (skip to FROMIOWA)
2. **Repeat Intro** (eligible person will come to phone); **Callback** (schedule callback)

Question **FROMIOWA**

Before we begin, to make sure you are eligible, do you reside in the state of Iowa?

1. **YES** (skip to VERIFYCOUNTY)
2. **NO** (skip to CLOSE)
8. Don't know (skip to CLOSE)
9. Refused (skip to CLOSE)

Question **VERIFYCOUNTY**

Our data show that this phone number is registered in [NAME COUNTY]. Is this the county in which you currently reside?

1. **YES** (skip to CONSENT)
2. **NO** (skip to WHATCOUNTY)
8. Don't know (skip to CONSENT)
9. Refused (skip to CONSENT)

Question **WHATCOUNTY**

What county do you reside in?

[COUNTIES CODED FROM (1) ADAIR to (197) WRIGHT]

0 = Really do not know what county but it is in Iowa
1 = Good county
200 = Not an Iowa county
201 = Refused

Question **WHATCOUNTY2**

I have that as: [NAME COUNTY]. Is that correct?

1. **YES** (skip to CONSENT)
2. **NO** (hit PREVIOUS, RE-ENTER)

9. Refused (skip to CLOSE)

Question **CONSENT**

As I mentioned at the beginning of this call, we are inviting randomly selected adult residents of Iowa to participate in a research study being conducted by investigators from The University of Iowa. The purpose of the study is to survey Iowans about their seat belt use and their opinions of seat belt laws.

If you agree to participate, we will ask you a series of questions on these topics. You are free to skip any questions that you prefer not to answer. It will take approximately three minutes for you to complete the survey.

We will not collect your name or any identifying information about you. It will not be possible to link you to your responses on the survey.

Taking part in this research study is completely voluntary.

If you have questions about the rights of research subjects, please contact the Human Subjects Office, 105 Hardin Library for the Health Sciences, 600 Newton Rd, The University of Iowa, Iowa City, IA 52242-1098, (319) 335-6564, or e-mail irb@uiowa.edu.

Are you willing to participate in this survey?

1. **YES**
2. **NO** (skip to CLOSE)

8. Don't know (skip to CLOSE)
9. Refused (skip to CLOSE)

Question **AGE**

What is your age? Are you:

1. Age 18-29
2. 30-39
3. 40-49
4. 50-59
5. 60-69
6. or age 70 or greater?

8. Don't know (skip to CLOSE)

9. Refused (skip to CLOSE)

Question **GENDER**

What is your gender?

1. **FEMALE**
2. **MALE**
3. **OTHER**

8. Don't know
9. Refused

Question **ISDRIVER**

On average, do you drive a passenger vehicle at least once a month?

1. **YES** (respondent is considered a driver)
2. **NO** (respondent is not considered a driver)

8. Don't know
9. Refused

[SECTION INTRO] The next few questions ask about your personal seat belt use over the last 6 months. Please select the response that best describes how often you use a seat belt.

[If respondent is not considered a driver, skip to PASSENGERFRONT]

Question **DRIVER**

When you are the driver of a vehicle, how often do you use a seat belt?

Would you say:

1. Always
2. Most of the time
3. Sometimes
4. Rarely
5. Never

8. Don't know
9. Refused

Question PASSENGERFRONT

When you are passenger in the front seat, how often do you use a seat belt?

Would you say:

1. Always
2. Most of the time
3. Sometimes
4. Rarely
5. Never
6. Have not been a front-seat passenger in the past six months

8. Don't know
9. Refused

Question PASSENGERBACK

When you are passenger in the rear seat, how often do you use a seat belt?

Would you say:

1. Always (skip to PROPOSEDLAW)
2. Most of the time
3. Sometimes
4. Rarely
5. Never
6. Have not been a rear-seat passenger in the past six months (skip to PROPOSEDLAW)

8. Don't know
9. Refused (skip to PROPOSEDLAW)

Question WHYNOT

Can you please explain why you do not always use a seat belt when you are a passenger in the rear seat?

[Interviewer records response. Summarizes if response is very long.]

Question IFLAW

If the law required passengers over the age of 18 to use seat belts in the rear seat, would you use a seat belt in the rear seat more often?

1. **YES**
2. **NO**

8. Don't know
9. Refused

Question PROPOSEDLAW

We are almost done with the survey. This final section asks your opinion about a possible change to Iowa's seat belt law.

Currently, Iowa law requires all passengers in the front seat and passengers under the age of 18 years riding in rear seats to be appropriately buckled. The proposed law would require all passengers in rear seats to use seat belts.

Do you think Iowa law should be changed to require all rear seat passengers to use seat belts?

1. **YES**
2. **NO** (skip to DONETHANKS)

8. Don't know (skip to THANKSBYE)
9. Refused (skip to THANKSBYE)

Question PASSENGERFRONT

How strongly do you agree that the seat belt law should be changed?

Do you strongly agree, somewhat agree, or only slightly agree?

1. Strongly agree
2. Somewhat agree
3. Slightly agree

8. Don't know
9. Refused

Question DONETHANKS

Those are all the questions that I have for you today. If you have any questions about this research study or your rights as a research participant, I have a phone number you can call.

Thank you very much for your time, and have a great day.

Question **NOT18**

Thank you very much for your time, but we are only surveying adults, 18 and over.

Have a great day!

Question **NOTIOWA**

Thank you very much for your time, but we are only surveying people from Iowa.

Have a wonderful day!

Question **THANKSBYE**

Those are all the questions that I have for you today. If you have any questions about this research study or your rights as a research participant, I have a phone number you can call.

Thank you very much for your time, and have a great day.

Question **ISDRIVING**

Because your safety is of the utmost importance, the researchers conducting this study have asked us not to interview anyone while they are driving.

[Hit control-end; attempt to reschedule]

Question **NOTSAFE**

Thanks, I hope we can reach you at a better time.

[Hit control-end; attempt to reschedule]

Appendix B: Final disposition of numbers attempted for phone survey

DESCRIPTION	RECORDS
COMPLETE*	1029
COMPLETE-NO OPINION*	48
INCOMPLETE: CALLBACK	11
INCOMPLETE: REFUSAL	95
REFUSAL: RESPONDENT	768
FINAL REFUSAL	117
HOUSEHOLD REFUSAL- ATTEMPTED	58
HOUSEHOLD REFUSAL	411
CALLBACK	100
ANSWERING MACHINE	2112
LANGUAGE BARRIER	38
INCOMPETENT/TOO ILL	9
BUSY SIGNAL	449
NO ANSWER	1626
CELL:OUT OF RANGE	97
>4 ATTEMPTS	50
FAX/MODEM	167
CHANGED NUMBER	41
DISCONNECTED NUMBER	1425

PROBLEM #	919
FAST BUSY-PROB #	862
BUSINESS/GOVT	405
NOT ELIGIBLE:AGE	23
NOT ELIGIBLE: AGE	16
NOT ELIGIBLE: OUT OF STATE	41
NOT ELIGIBLE: OTHER	11
TOTAL ATTEMPTED	10928

*Included in analysis